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CONTINUATION APPLICATION FOR UNITED STATES PATENT

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Title: **TRAINING BAT AND METHOD**

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SPECIFICATION

TRAINING BAT AND METHOD

Related Application

This application is a continuation of U.S. Patent Application Serial No. 09/817,863 filed March 26, 2001 entitled "Training Bat and Method", which was a continuation of and claims the benefit of and priority to prior filed Provisional Application No. 60/192,287, filed March 27, 2000, which is expressly incorporated herein by reference.

Field of the Invention

The present invention is directed to a training bat and method for baseball, especially a training bat having a reduced diameter barrel section yet still retaining the length and weight of a conventional bat. The training bat and method of this invention are intended to enhance the performance of baseball players at all levels, from experienced pros down to beginners, including children.

Background of the Invention

In the field of athletic performance enhancement, raw strength and explosive power may be sufficient to succeed in some sports. Baseball, however, is a sport which requires explosive power coupled with pinpoint accuracy. An explosive swing, poorly timed, may result in a mishit in the wrong direction or a failed attempt to make contact.

A batter's swing is basically comprised of three components: power/velocity, accuracy, and timing. A deficiency in any of these components diminishes the effectiveness of the batter's swing. One approach to improving the batter's swing entails focusing on one component of the swing at a time. For example, a batter may train with a bat which is heavier than a conventional bat. The use of the heavier bat focuses on improving the power/velocity component of the batter's swing. That is, the heavier bat does little to enhance the accuracy and timing of a batter's swing. In contrast, bats which are lighter than conventional bats focus the batter's attention only on swing accuracy and not timing. In essence, training bats that change the weight of the conventional bat focus on only one component of the batter's swing. What is needed, therefore, is a training bat that is configured to enhance at least two of the swing components simultaneously.

Another important feature of the batter's swing is the batter's entire visual system, including the eyes, brain, and body. In sports, the purpose of the visual system is to gather information about what is going on around the athlete and guide the appropriate movement pattern. A batter can improve the effectiveness of his swing if he also trains his visual system to move the bat at the proper time and location.

By way of background, the following description relates to the visual aspects of athletics in general and baseball in particular. Many so-called physical

mistakes may be attributed to visual deficits. Some academic weaknesses may also be a function of poor visual skills or undue fatigue. According to Dr. Paul Planer, an optometrist and on the board of The International Academy of Sports Vision, too often the only concern of coaches, trainers, and some athletes with the visual system is with static visual ability (SVA). This statistical measurement is the ability of the athlete to resolve (identify) a certain sized letter/number on the highest contrast target available (black letters on a white background) on your standard eye chart (i.e., 20/20, etc.). The ability to discern detail in an object is called visual acuity. There are many factors that affect visual discrimination including contrast, lighting, motion, time, color, age, attention ability.

There are a variety of visual abilities utilized by athletes and non-athletes alike whenever there is a decision to be made involving the coordinated efforts of hand and eye. The following is a synopsis of some of these visual abilities, a couple of easy to administer assessments, visual enhancement exercises to train the athlete's eyes, and how the training bat and method of the present invention address some of these particular visual abilities.

Static Visual Acuity - the ability to resolve various sizes of letters/numbers from a standard distance. Although the importance of this stationary ability is minimal in other sports, for baseball it is desirable that the athlete have at least 20/15 to 20/10 acuity for resolving the size of the baseball from a standard distance (length of bat), and determining spatial relationships.

Dynamic Visual Acuity - the ability to maintain clarity of an object while either the object or the athlete, or both, are in motion (as in a pitched baseball). Deficits in this ability can cause perceptions of the viewed object to vary. Deficits in clearness can affect timing during a swing.

Contrast sensitivity - this is the ability of the visual system to discriminate variations in color of the object looked at in comparison with the color of the background the object may be against. In baseball, a white baseball against a dark outfield wall such as when the baseball is pitched provides for a sharp contrast and allows the batter to more readily see the pitched baseball. As the brightness and color of background merge closer (as in tracking a baseball against a light colored outfield wall), the contrast of the baseball becomes less. In baseball, the ability to track the baseball in flight or on the ground is of significant value as the player attempts to intercept the baseball. This sensitivity is the smallest amount of distinction between object and background that can exist while still being distinguishable by the athlete. It may be possible to enhance the ability to see a pitched white baseball by taking batting practice in front of a light colored background.

Eye Movement (Ocular Motility) - this is the ability of the athlete to physically shift his eyes from place to place in space rapidly, and accurately without hesitation or fatigue. Athletes keen in this ability can quickly make decisions such as whether to swing at a particular pitch. An athlete deficient in this ability may commit to swinging at a bad pitch without time to change the decision. Thus, eye movement is a key element in baseball.

Fusion - the eyes send information to the brain where the information is integrated and interpreted as a three-dimension (3-D) phenomenon. The integration of visual information from both eyes into a 3-D image is called fusion. The integration of visual information is termed fixation. Typically, a person's focusing ability is limited to 3 degrees. To get an idea of the size of this visual field, one can extend his arm straight and forward with his thumb pointing vertically. The width of the thumb in this position is an approximation of the size and focus of your visual field.

Focus Flexibility (Accommodation) - the ability that allows the athlete to change focus from one point in space to another and to maintain precise clarity such as shifting from home plate to the pitching mound during a pitch.

Fusion Flexibility (Binocularity) - this is the ability to accurately "team" the two eyes together so they perform as one as the athlete glances around, shifts focus, and follows the ball.

Depth Perception - the ability of the athlete to rapidly and accurately utilize fused images from the eyes to judge distance from the ball. Obviously this is closely related to the former three abilities.

Visual Reaction Time - the time required to perceive and respond to visual stimulation. Involved in this ability is the effectiveness of the athlete to utilize auditory (sound) information to assist in any visual stimulation.

Central Peripheral Awareness - sometimes referred to as side vision. This is the ability of the athlete to maintain a "hard focus" on the central task such as striking the ball while screening out the activity to the side such as movement in the surrounding stands. Other sports rely on the athlete's ability to maintain an awareness or soft focus on "side" activity, baseball demands that this activity is eliminated from the only task at hand - focusing on the ball.

Eye-Hand-Body Coordination - this ability is related to proprioception, or the ability to have a sense of where limbs are in space without looking at them. This ability is key when swinging at a pitched baseball. The batter must "feel" where the hands and feet are without looking. Eye-hand-body then is an integration of the eyes, the hands, and the body as a unit. While the eyes must lead and guide the motor (movement) system, sense of limb awareness is paramount.

Visual Adjustability - this relates to the athlete's ability to have a visual system flexible enough to rapidly adjust and guide the body's motor responses quickly and accurately as the surrounding environment changes. A lack of being "tuned into" the body's responses is exemplified in an inability to adjust to unfamiliar ballparks, surfaces, brightness, time zones, etc. A batter plays at opponents' fields for nominally half of the season, which is why batting practice before an "away" game is so important.

Visualization - familiar to many coaches, the ability to mentally imagine and rehearse situations, actions, and responses that can occur during play, and modify them to be more efficient and correct. As anything, the exercise gets better with practice, and therefore should be done year-round, during games and practices, and away from games and practices. If an athlete cannot visualize, they may be deficient in the ability to learn from mistakes.

Eye (Sighting) Dominance - everyone has a dominant eye that sends information to the brain slightly faster than the other. This dominant eye directs the movement and fixation of the other eye. Therefore it is prudent for the batter to stand in the batter's box so his head has an unobstructed and aligned view of the baseball with the dominant eye. In order to test which eye is dominant, one may extend his arms straight and forward and form about a 1" diameter triangular hole by connecting both thumbs and index fingers. That person should pick a distance object on a wall, and center it between the triangle. Without moving head or hands, the person should close one eye, then the other. The eye that has the object lined up closest to the hole is the dominant eye.

Visual Search Patterns (Saccades) - how an athlete watches the motion of an object being tracked may help determine what is seen and not seen by an athlete. The types of eye movements used in tracking an object is actually a very complex process.

Sports like volleyball rely on Saccadic eye movements in order to observe action. Eyes can follow an object smoothly up to visual angular velocities of about 70 degrees per second. Volleyball, for example, requires visual angular velocities in excess of 500 degrees per second in order to follow the trajectory of a spike. While saccades can reposition eyes to track an object at angular velocities exceeding 700 degrees per second, the eyes "turn off" briefly as they saccade or move to the next fixation. In other words, the eyes move in frames perhaps exemplified in baseball when a batter's eyes attempt to track a 95 MPH fastball coming from the pitcher's mound.

The athlete should be tested in order to probe for visual deficits and to provide a baseline set of measures to integrate into a visual enhancement program. Tests and measures from a strength, conditioning, movement, or sport standpoint should reflect the movement, energy system, and task-specific demands of the sport. Visual assessments which do not take a dynamic environment into consideration are inadequate to assess visual abilities.

It is important now to introduce the concept of Divided Attention. During assessments and drills the athlete should be required to perform an additional task (balancing, solving math problems, game situations, etc.) known as the "soft focus" while maintaining a "hard focus" on the central task (in this case the visual assessment or exercise).

The following description relates to various test probes which may be utilized to assess visual acuity.

SVA or Static Visual Acuity - although the testing only begins here, it is still important. This can be done by a team physician, usually monocularly first, then binocularly at a distance of 20 feet with moderate lighting.

Ocular Motility Near (Testing "oneness" of eyes).

Pursuits (Near Vision) - goal: to test and train visual accuracy for tasks occurring in a close visual hemisphere such as blocking and setting

1. Target: small bell on a clear string of nylon or thin black thread.
2. Technique: move the target in front of the athlete in a random motion in various positions of gaze from arm's reach distance to his forehead .
3. Observe: watch for loss of fixation on the bell (hint: eyes will wander), head movement, crossing or closing one or both eyes.
4. Divided Attention: have the athlete solve math problems, game situational tactics, balance on two tennis balls or one leg, etc. on top of the requirement and record the effects.

Saccades (Near Vision)

1. Target: same as pursuits except use at least two of them requiring the athlete to shift eyes on command back and forth to each bell.
2. Observe: same as pursuits, but look at eyes to determine if they "overlook" or "underlook" the target and how quickly they get back to the central target bell. Does it just take a glance (through visualizing the previous position, or is there time spent looking).
3. Divided Attention: same as above.

Near To Far

1. Target: Use the dangled bell as the near target. The far target can be any small target at least 10 feet away such as a snellen chart (typical eye chart), clock's hand, person holding fingers or juggling numbered/colored balls, people on the street and the clothes they are wearing, other miscellaneous targets, etc. Upon

direction, the athlete is to shift his visual attention from the bell to the distant target, etc. The goal is to train the athlete to obtain more information from a glance as in lining up a putt.

2. Divided Attention: same as above and use your imagination. Just reproduce when re-testing.

Binocularity - Near Point of Convergence (Eye Teaming)

1. Target: Block on a string

2. Technique: the athlete holds the end of a string with two colored beads on the tip of his or her nose. The athlete should focus on one of the beads. Record how many strings the athlete reports and if possible where the strings meet (if at all) within the field of vision. The athlete should see two strings at all times, in all distances, in all directions of the string, and for them to meet each other at the bead as opposed to in front or beyond the bead. At times one of the strings may cross the other further/closer or above/below the other or one string may disappear or crossing points may fluctuate. Start with the string attached in a straight line to a fixed location, then proceed downward which is more specific to the game of golf.

3. Evaluate: record if the strings cross beyond where the bead is located, in front where the bead is located. If the string seen by the athlete coming from the left side appears above the plane, record this as right hyper. If the string appearing above the plane appears above the plane of the bead, record as left hyper. Note if the string disappears, record when and where.

4. Distances: distance bead is at 20 feet, the intermediate bead is at 10 feet, and the near bead is at 3 feet from the athlete's face.

The next category, visualization, will include not only an assessment, but how the "assessment" can then be used as a task-specific visual training aid for a batter.

Visualization - the ability to mentally rehearse and perform an athletic situation. In this situation, the athlete will quickly process information and physically perform a movement. Since the athlete may have to perform a different action than what he or she sees - they must - in a matter of milliseconds, mentally rehearse that movement. The batter mentally rehearse swinging at pitches of various styles, such as fast balls, sliders, curve balls, and the like. The batter should make a mental note on the feel of a properly struck baseball.

Central Peripheral Awareness - maintaining focus on a central task while screening out information to the sides is especially good for batters.

It is also important for any athlete to practice in order to mimic gamelike situations such as movement patterns in a very focused and controlled environment. Training by design is done to show the mind and body that they are capable of operating at higher levels.

Summary of the Invention

The training bat of the present invention has a length and weight substantially equivalent to that of a conventional bat. The training bat is comprised of a barrel section, a handle, and a transition section intermediate to the barrel section and the handle section. The barrel section has a diameter which is smaller than that of a conventional bat. However, the barrel section also includes a weighted member such that the training bat has a weight which is substantially equivalent to that of a conventional bat.

The present invention also provides a swing training method which utilizes the training bat described above. The method involves a batter swinging at a baseball with the training bat having the reduced diameter barrel section. Next, the batter swings at the baseball with a conventional bat. That step is followed by the batter swinging at a ball having a smaller diameter such as a golf ball using the training bat and then using the conventional bat.

Description of the Figures

FIG. 1 is a plan view of one embodiment of the training bat of the present invention; and

FIG. 2 is a cross section of the training bat of FIG. 1 taken along lines 2-2.

Detailed Description of a Preferred Embodiment

With reference to FIGS. 1 and 2, a training bat 10 in accordance with the principles of the present invention has a barrel section 12, a transition section 14, and a handle section 16. The barrel section 12 has a diameter D which is substantially constant along the entire length of the barrel section 12. The handle section 16 has a diameter d which is substantially constant over the length of the handle section 16. Transition section 14 has a non-constant diameter to accommodate the change in diameter between diameter D of the barrel section 12 and diameter d of the handle section 16. As illustrated in Figs. 1 and 2, barrel section 12, transition section 14, and handle section 16 are constructed of wood. It will be appreciated that these sections could be constructed of any suitable material having the necessary weight and strength requirements. For example, these sections could be constructed of plastic composite, aluminum and its alloys, aluminum-titanium alloys, beryllium and the like.

The training bat 10 of the present invention is constructed to have a weight and length substantially equivalent to a conventional bat. However, the diameter D of barrel section 12 is reduced in size relative to the barrel section of a conventional bat. The typical diameter of the barrel section of a conventional baseball bat is 2 ¾ inches and 2 ½ inches for the barrel of a softball bat. Youth bats such as those used in Little League typically have a barrel diameter of 2 ¼ inches. In contrast, the diameter D of the barrel section 12 of the training bat 10 ranges between about 1 ½ inches to about 1 ¾ inches, and is preferably 1 ⅝ inches.

Because the diameter D of the barrel section 12 is smaller relative to a conventional baseball or softball bat, the training bat must be augmented with additional weight so that its weight is substantially equivalent to that of a conventional baseball or softball bat. To that end, the end of the training bat 10 is drilled out and an elongated rod 18 is inserted into the drilled out portion of the barrel section 12. The size, i.e., length and diameter, of rod 18 should be chosen such that it replaces both the weight of wood eliminated because of the reduced diameter D of barrel section 12 and the weight of wood removed when the barrel section 12 is drilled out. Using the elongated rod 18 helps to maintain the proper weight distribution along the length of the training bat 10 relative to a conventional bat. The rod 18 may be constructed of any suitable material having the appropriate weight and strength, such as steel, for example. Table 1 shows representative length/weight combinations of conventional bats. Because the training bat 10 of the present invention will match the weight/length combinations of conventional bats, Table 1 also applies to the training bat 10.

TABLE 1

Length/Weight Combinations

LENGTH (inches)	WEIGHT (ounces)		LENGTH (inches)	WEIGHT (ounces)		LENGTH (inches)	WEIGHT (ounces)
25	16		31	22		34	28
	15			23			26
	16			24			27
26	15			25			27
	16			26			28
	17			27			30
27	16			28			31
	17			29			32
	18			30			33
28	17			31			34
	18			32			35
	19		32	28			35
29	16			25		35	28
	18			26			28
	20			27			29
30	20			28			30
	21			24			31
	22			30			32
	23			31			33
	24			32			34
	25			33			36
			33	25		36	30
				26			31
				27			32
				28			33
				29			34
				30			35
				31			36
				32			
				33			
				34			
				35			

The length/weight combinations of Table 1 would be used in order to size rod 18 so that the weight of training bat 10 can be modified to meet the batter's preference.

The training bat 10 is most effective if used in conjunction with a structured training program. The training bat 10 of the present invention teaches the batter to hit the optimal sweet spot of the training bat 10 as well as establish an exact swing tempo. By isolating the sweet spot of the training bat 10 and forcing precise accuracy and concentration, while maintaining swing weight integrity, the training bat 10 teaches the batter how to carry out a very accurate and timely swing.

Tables 2-5 provide a representative structured training program for batters. The training can be accomplished using tee work, ball toss, cage work or batting practice and combinations thereof.

TABLE 2
Tee Work

	# of Hits w/ Acuity Bat:		# of Hits w/ Game Bat:
Start:			
Baseballs	5	Followed by	15
Move to:			
Golf balls	5	Followed by	15
Finish:			
Baseballs	5	Followed by	15

TABLE 3
Ball Toss

	# of Hits w/ Acuity Bat:		# of Hits w/ Game Bat:
Start:			
Baseballs	5	Followed by	15
Move to:			
Golf balls	5	Followed by	15
Finish:			
Baseballs	5	Followed by	15

TABLE 4
Cage Work

	# of Hits w/ Acuity Bat:		# of Hits w/ Game Bat:
Start:			
Baseballs	5	Followed by	15
Move to:			
Golf Balls	5	Followed by	15
Finish:			
Baseballs	5	Followed by	15

TABLE 5
Batting Practice

	# of Hits w/ Acuity Bat:		# of Hits w/ Game Bat:
Baseballs	5	Followed by	15

The structure of the training program is similar regardless of the type of batting practice. For example, for cage work (Table 4) the batter starts the training session by swinging the training bat 10 five times at baseballs. This step is followed by fifteen swings at baseballs using a conventional bat. Following that, the batter swings the training bat 10 five times at golf balls. The batter then swings a conventional bat fifteen times at golf balls. The next phase repeats the first phase of the training. A similar methodology is used for each of the different methods of batting practice: tee work, ball toss, cage work, or batting practice. With the cage work and batting practice, the pitches are thrown initially at moderate speeds with the speed increasing as the batter's hitting improves.

The above mentioned training program consists of exercises that improve the athlete's vision by systematically teaching the entire visual system (eyes to brain to body) how to operate at higher levels. The training bat 10 takes visual training into the highest realm of "integrated specificity" where the athlete combines visual training and specific skill development. Integrated specificity selectively controls the amount of information received during training to force the athlete to execute a sport specific movement with precise form, focus, and accuracy. Typically the athlete starts with a very small and controlled movement pattern and then gradually increases the movement along a series of progressions. At any time which form, focus or accuracy is lost the movement is reduced until they are regained. In short, integrated specificity recreates game situations in a highly stressful but controlled environment. The training bat 10 combines visual training designed to improve visual skills such as eye teaming, binocular coordination, depth perception, focus flexibility, acuity (clarity of sight), "hand-eye" or "visual-body" coordination with actual hitting skills such as swing, tempo, and timing.

While the invention has been described with specific examples in reference to specific dimensions, persons skilled in the art will appreciate that various modifications and changes may be made to the invention as described herein without departing from the spirit and scope thereof which are defined by the appended claims.

WHAT IS CLAIMED IS: